# AI Done Right

## Take Home Assignment

techolution

Innovation done right

# Instructions

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- The time limit to complete the assignment is 3 hours.
- The candidate is allowed to use whatever tools at their disposal to complete the assignment.
- The candidate is not expected to write any code or train any model to complete the task.
- The candidate is expected to create a written .PDF file as the output from the assignment.
- The candidate is expected to email the assignment to faceopen@techolution.com within the allotted time of 3 hours
- Make sure to send the assignment to the above email with the same email you used to register with us.

# Problem Statement

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You are given the following components for an inventory tracking system for a bakery that keeps track of different food items kept in colored boxes inside of a warmer. There are 11 different items kept in uniquely colored boxes that can be present in the warmer in different quantities.


1. 4 cameras
2. A Raspberry Pi 4 w/Wi-Fi
3. A Google Cloud VM w/ GPUs
4. A database of your choice
5. Optional: Any GCP service that fits your requirement

You need to build the following system.

- The camera is pointed at several colored boxes kept in a warmer
- You need to run a motion detection algorithm for every camera. Running the motion detector on the Raspberry Pi takes ~2 seconds to process per camera.
- The time taken between motion happening in the real world and data preparation to be sent to the backend needs to be less than 4 seconds.
- Once the motion is detected in any of the 4 streams you need to capture the latest image and send it to the backend.
- **Each image is around 7MB, how can you send the image to the backend that would have the lowest impact on performance?**
- Once the data is received in the backend, it is ran through several algorithms for image processing.
- All 11 different types of objects are first detected using a single-class YOLO model.
- After obtaining the bounding box for every item in the warmer, we crop the image and the identification of the object is inferred using a CNN that classifies the object into the 11 different possible categories.
- As a fallback method, we also run a simple clustering algorithm that finds the identity of the object using a color clustering algorithm since all the different classes are kept in different colored boxes.
- **How would you utilize this fallback method? Can you recommend a better fallback strategy?**
- We then measure the count of every item and is updated in the database.

# Expected Outcome

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Create a simple architecture diagram that explains the required services for the application. **The diagram needs to be as in-depth as possible.** You have the freedom to add or remove any components from the problem statement if and only if they provide any meaningful value.